goddard news

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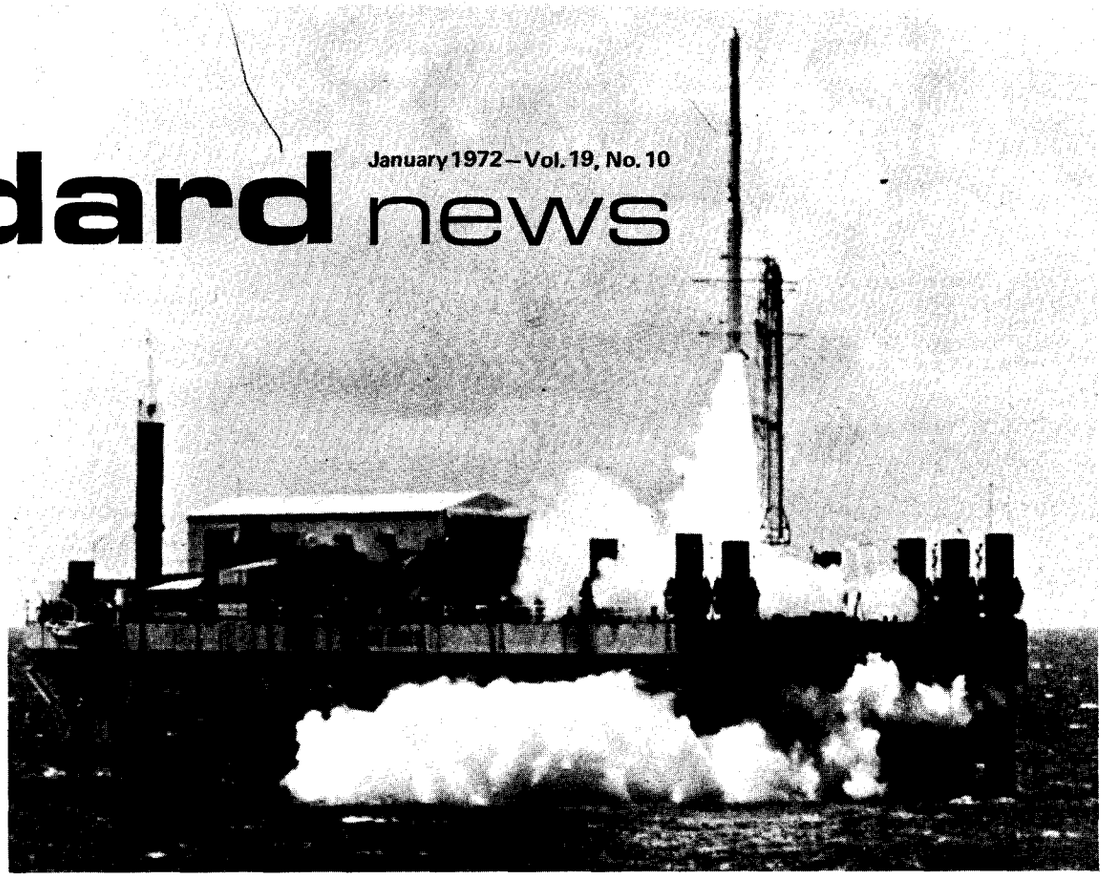

INTERNATIONAL PROGRAMS. The year 1971 saw two satellites launched from Italy's platform off the coast of Kenya (above), a scientific satellite launched by the U.S. and Canada, and another for the United Kingdom, a meteorological satellite sent aloft for France, and the successful completion of a German barium cloud experiment.

NASA 1971 Highlights

Two successful Apollo moon landings, a new orbiting observatory for studying the Sun, a Mariner in Mars orbit and five international programs were some of NASA's successes in 1971.

The two Apollo missions were marked by a high level of scientific competence and a greater mobility for the crews on the lunar surface. Apollo 14, January 31 to February 9, used a pull cart for the first time to carry cameras and geological tools. The cart allowed surface explorations of 3.5 kilometers (2 miles). During their nine and one-half hours outside the lunar module, the astronauts collected 43 kilograms (94.6 pounds) of rocks, and deployed the second lunar geophysical station. Crew members on Apollo 14 were: Alan B. Shepard, Stuart A. Roosa, and Edgar D. Mitchell.

On Apollo 15, the fourth lunar landing, July 26 to August 7, David R. Scott and James B. Irwin remained on the Moon for almost 67 hours while Alfred M. Worden performed scientific experiments in lunar orbit. During three periods of lunar exploration, the astronauts traveled 28 kilometers (17 miles) in a four-wheeled, battery-powered lunar roving vehicle. They brought back 77 kilograms (170 pounds) of lunar rocks. One white crystalline rock, anorthosite, appears to be about four billion years old.

The seventh Orbiting Solar Observatory and Mariner 9 were two top scientific projects of 1971. Goddard's OSO 7, placed in Earth orbit on September 29, was rescued by ground controllers after a stabilization problem in the second stage of the Delta launch vehicle left the spacecraft tumbling in space. During an eight-hour battle of wits, crews at Goddard's OSO Control Center and four tracking stations were able to stabilize the observatory so that its solar panels could lock on the Sun. A short time later, OSO 7 made the first x-ray observations of the beginning of a solar flare. OSO also has detected that the Sun has polar caps or areas at the poles that are a million degrees or so cooler than the rest of the star.

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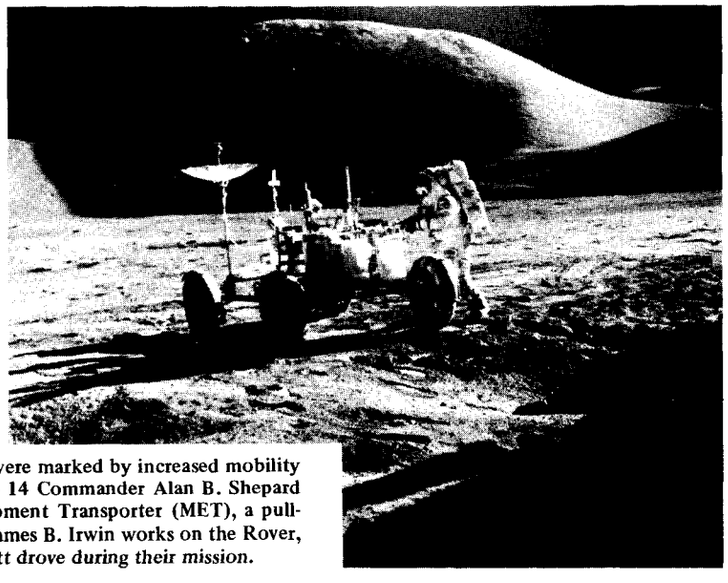


TWO APOLLO MISSIONS in 1971 were marked by increased mobility on the lunar surface. At left, Apollo 14 Commander Alan B. Shepard stands beside the Modularized Equipment Transporter (MET), a pull-cart. At right, Apollo 15 astronaut James B. Irwin works on the Rover, a battery-driven car he and David Scott drove during their mission.

HIGHLIGHTS . . . From Page 1

JPL's Mariner 9 was put into orbit around Mars on November 13. The spacecraft was launched on May 30 and traveled 400 million kilometers (248 million miles) to its destination. Mariner found a hostile planet covered by a dust storm that saturated the atmosphere with fine dust and made early pictures of the surface almost impossible. The spacecraft did, however, transmit to Earth the first pictures showing the surface features of the Martian moons, Deimos and Phobos. Good data on the planet itself has been obtained from sensors, such as Goddard's Infrared Interferometer Spectrometer (IRIS), that are not so hampered by the dust. Early results include temperature profiles of the Martian atmosphere by IRIS that show the upper layers to be considerably warmer than expected.

In the area of scientific satellites and experiments, 1971 was a year of international programs. On March 13, Goddard's Delta rocket launched the International Satellite for Ionospheric Studies (ISIS-B), a cooperative Canadian/NASA satellite. On August 16, NASA launched a French meteorological satellite called EOLE for the mythological French god of the winds. The prime mission of EOLE is to collect information on winds, temperatures, and pressures from high altitude instrumented balloons in the Southern Hemisphere.

Italy's San Marco launch platform off the coast of Kenya was the launch site for two satellites in 1971. On April 24, Italy launched its own San Marco 3 satellite to study the environment of the upper atmosphere in the equatorial region. On November 22, the Italian crew launched Goddard's Small Scientific Satellite (Explorer 45) on a complicated mission to investigate the causes of world-wide magnetic disturbance associated with large solar flares. Launch vehicle for both San Marco launches was NASA's Scout.

Also in the news in '71 was the Small Astronomy Satellite (Explorer 42) which was launched from San Marco on December 12, 1970. Early in the year, SAS discovered a new pulsating X-ray star quite unlike the one other known X-ray pulsar.

Another cooperative project of 1971 was a German barium ion cloud experiment to study the behavior of the Earth's magnetic field at 36,000 kilometers altitude. The satellite was launched on September 20 aboard a Scout from Wallops Island.

The final international launch of the year was the United Kingdom's Ariel 4 on December 11 from the Western Test Range.

Other projects of 1971 included a Goddard Interplanetary Monitoring Platform (Explorer 43) launched on March 13 and NRL's SOLRAD (Explorer 44) launched on July 8. Two Intelsats were sent aloft for the Communications Satellite Corporation and another communications satellite was launched for the North Atlantic Treaty Organization. An ITOS meteorological satellite for the National Oceanic and Atmospheric Administration failed to achieve orbit.

On June 20, the Ames Research Center successfully conducted the Planetary Atmosphere Experiment test. The sub-orbital capsule, carrying a Goddard mass spectrometer as part of its payload, demonstrated in the Earth's atmosphere the ability of selected experiments to determine the structure or composition of an unknown planetary atmosphere from a probe vehicle entering the atmosphere at high speed.

Non-space-related activities of 1971 included a project by NASA and the U.S. Department of Agriculture to conduct a joint experiment using remote sensing devices on aircraft to gather information on southern corn leaf blight.

An Ames Research Center team found amino acids (building blocks of living cells) in a second meteorite, strengthening the case for chemical evolution of life elsewhere in the universe.

Aerospace technology continued to find its way into other segments of American life. A computer program called NASTRAN developed here at Goddard is being used in the design of new models of light trucks and passenger cars.

Major NASA Launches of 1971

Intelsat IV-F-2	Jan. 25	First in a new series of global communications satellites to form part of a global communication, commercial satellite system. In orbit.
Apollo 14	Jan. 31	Manned lunar landing mission. Astronauts: Alan B. Shepard, Stuart A. Roosa, and Edgar D. Mitchell. Successful.
NATO-B	Feb. 2	Military communications satellite. Delta launched. Successful.
Explorer 43	Mar. 13	Interplanetary Monitoring Platform to study solar-lunar-terrestrial relationships. Delta launched. Successful.
ISIS-B	Mar. 31	Cooperative Canadian/NASA scientific satellite. Delta launched. Operating satisfactorily.
San Marco	April 24	Italian scientific satellite to investigate Earth's equatorial atmosphere. Reentered.
Mariner 8	May 8	Mars orbiter. Launch failure.
Mariner 9	May 30	Mars orbiter to take pictures and investigate atmosphere and surface features of planet. Achieved Mars orbit on Nov. 13.
PAET	June 20	Planetary Atmosphere Experiment Test. Successful.
Explorer 44	July 8	NRL SOLRAD satellite to monitor Sun's X-ray and UV emission. Successful.
Apollo 15	July 26	Manned lunar landing mission. Astronauts: David Scott, Alfred M. Worden and James B. Irwin. Successful.
EOLE (CAS-A)	Aug. 16	U.S./French cooperative meteorological project. Balloons for testing the feasibility of satellite/balloon systems for gathering global meteological data were released in the southern hemisphere beginning Aug. 25.
German Research SAT-B	Sept. 20	Particle and fields investigation of barium ion cloud behavior at several Earth radii. Cooperative Germany/NASA project. Good data obtained.
OSO 7	Sept. 29	Orbiting Solar Observatory. Delta Launched. Obtaining good data.
ITOS-B	Oct. 21	Operational meteorological satellite developed by NASA and funded by NOAA. Delta launch vehicle failure.
Explorer 45	Nov. 15	Small Scientific Satellite. Obtaining good data.
Ariel 4 (UK-4)	Dec. 11	Cooperative United Kingdon/U.S. satellite to investigate plasma-charged streams and electromagnetic waves in the upper atmosphere. Obtaining good data.
Intelsat IV-F-3	Dec. 20	Global communications satellite to form part of a commercial satellite system. In orbit.

Ariel 4 in Orbit

The fourth satellite in a cooperative space program between the United States and the United Kingdom was successfully launched into orbit by a NASA Scout rocket December 11 from the Western Test Range, California.

Called Ariel 4, the 220-pound satellite carries one U.S. and four British experiments to study the ionosphere from a nearly circular orbit of about 500 kilometers above the earth.

Herbert L. Eaker, Goddard Project Manager for the satellite, reported as *Goddard News* went to press that an extensive checkout program being conducted for Ariel 4 was proceeding as planned. He expects the satellite will be fully operational in mid-January after the U.S. experiment, provided by the University of Iowa, has completed its checkout.

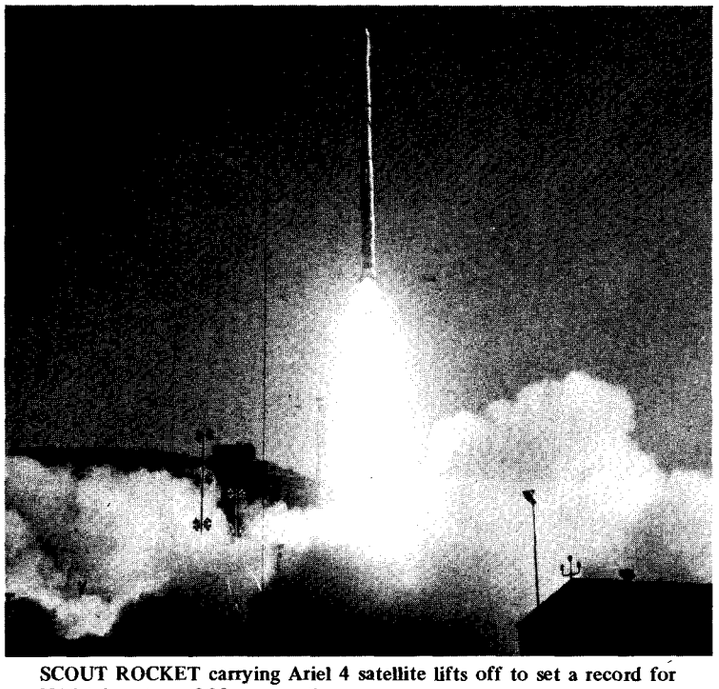
Data received thus far from operating experiments on the satellite have been excellent, according to Mr. Eaker.

In addition to the University of Iowa experiment, experiments were also provided by Birmingham University, the Jodrell Bank Observatory of the University of Manchester and Sheffield University. Overall management of the United Kingdom portion of the program is under the Science Research Council.

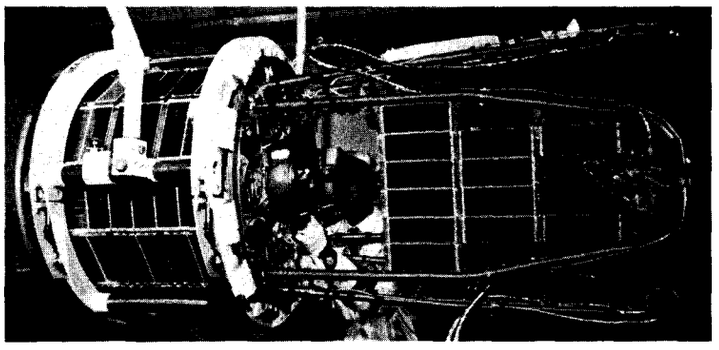
The Ariel 4 launching was the 23rd consecutive success for the four-stage, solid fuel rocket. This is a record for NASA satellite boosters.

The region in which the satellite is operating—the upper reaches of the ionosphere—is where complex interactions between the plasma (an ionized gas), charged particle streams and electromagnetic waves occur. A better understanding of these complex mechanisms could lead to greater insights into apparently related phenomena taking place nearer the earth.

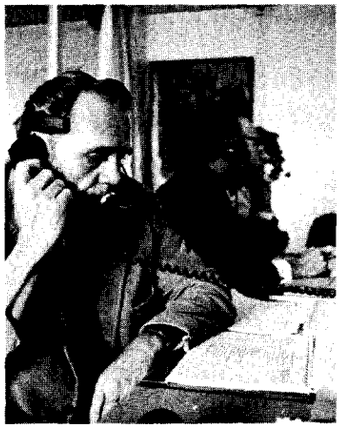
In addition to Mr. Eaker, other key Goddard people involved in the program include Dr. George E. Pieper, Project Scientist; Wilbur C. Nyberg, Project Coordinator; William F. Mack, Missions Operations Systems Manager; and Curtis E. Cullison, Resident Business Manager.



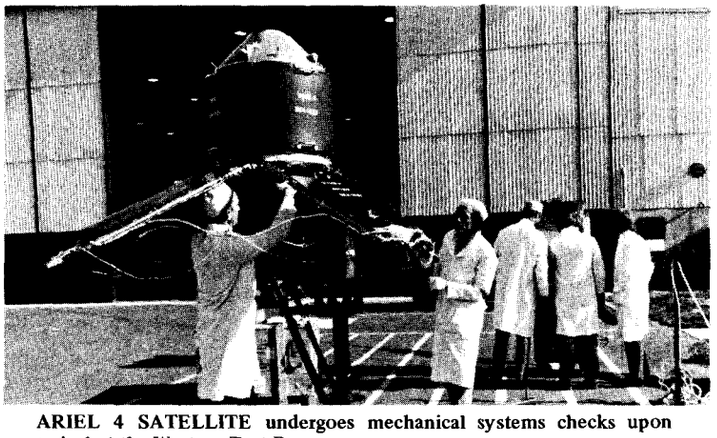
SCOUT ROCKET carrying Ariel 4 satellite lifts off to set a record for NASA boosters of 23 consecutive successes.



TECHNICIAN makes final checks on the 220-pound Ariel 4 satellite. The British-built satellite carries five scientific experiments including one from the University of Iowa.



GODDARD Ariel 4 Project Manager Herbert L. Eaker (left) with John Smith, U. K. Project Manager, during countdown at the Western Test Range.



ARIEL 4 SATELLITE undergoes mechanical systems checks upon arrival at the Western Test Range.

PRE-LAUNCH BRIEFING. C. R. Fuentes (left), Kennedy Space Center (WTR) Mission coordinator, briefs key people from the United Kingdom on Scout launch procedures at mission control center. Shown are John F. Smith, Ariel 4 Program Manager; Robert Dalziel, Project Scientist; Dr. William Francis, Secretary of the Science Research Council; and Dr. John Saxton, Director, Radio and Space Research Station, Science Research Council.

CHILDREN'S PARTIES. Santa and Mrs. Claus came to Goddard on December 12 for the annual Christmas parties, and before they left nearly 1000 children had received specially chosen gifts. The kids, with the help of their parents, consumed over 1800 hot dogs during the GEWA-sponsored events. For a look at what went on, turn the page. Parents who recognize their children may obtain a copy of the picture from the Director's Office.


DANCER
CUPID


PRANCER
DANCER
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AWARDS AND HONORS

DR. BENJAMINE SEIDENBERG of the Materials Engineering Branch has received an award as co-inventor of a system for collecting gas samples. The invention, "Method and Apparatus for Determining the Contents of Contained Gas Samples," by Dr. Seidenberg and his former co-worker Alfred J. Hobbs, was devised to meet the need for the analysis of gases within proportional counter tubes.

INVENTION AWARD. John New (center), Chief of the Test and Evaluation Division, recently presented an Invention Award to Jim Kerley (left) and Norman Schaller. The invention was for an "Apparatus for Vibration Testing of Articles" which provides a unique mounting arrangement for a multi-axis vibration system.

SUGGESTION AWARD. Kenneth E. Gardner of the Mechanical Division (left) received a Suggestion Award from Dr. John F. Clark, Goddard Director, during the Management Council Meeting on December 20. Mr. Gardner's suggestion that a surplus OAO shipping container be modified and used for the IMP-1 spacecraft saved Goddard over $122,000.

JOHN A. KLISH (second from left) receives an Invention Award from Samuel W. Keller, Deputy Director of Administration and Management. With him are his supervisor Hugh B. Bauer (left), Head of the Mechanical Engineering Section; and James F. Mills (right), Chief of the Facilities Engineering Division. Mr. Klish was co-inventer with Richard E. Wiberg of a "Combustion Products Generating and Metering Device."

Building 14
Transformer Installation

MAINTENANCE PERSONNEL from POMD's Electric Shop work on the 1000 KVA liquid transformer bank in Building 14 which was recently installed to serve the NASCOM computers, the 360-75 realtime computers, and the control centers for Goddard supported spacecraft. From left are Larry Schindling, George Russell, Abraham Irby and Group Leader Jett Trent. Not shown are Leon White and William Hafflefinger. The new transformer bank replaces a 750 KVA air-cooled transformer, and supplies the additional capacity needed to support the growing requirements of the Building 3/14 complex and to improve the overall system reliability. POMD mechanics did the complete job of installation and testing. They removed the old transformer, welded in new supporting steel work, moved in the new transformers (a very delicate job since the transformers had to be maneuvered around operating computers), fabricated and installed the buswork, installed a new high voltage switch and new wiring.

PLANNING AHEAD FOR THE NEW YEAR. The 1972 Goddard Dance Committee paused long enough from their busy planning schedule to pose for this picture. From left are (standing) Bob Heuser, Charley Vest, Tom Hamilton, Gil Bullock, Joe Roper and Chairman Roger Tetrick. Seated are Jean Hubbard, Elaine Montgomery, Janet Burke, Brenda Parkinson, Shirley Darby and Barbara Hamilton. Not present were Owen Kardatzke and Margaret Wells. The Committee suggests that you start your early planning now. The dance will be held on April 7 at the Indian Springs Country Club and, as before, the highlight of the evening will be the crowning of the new Goddard Queen.

COSMIC Programs in Down-to-Earth Uses

An improved "tool" for designing automobiles and a system for detecting environmental pollution are two applications of computer programs developed here at Goddard and made available to the general public. The programs were distributed through Goddard's Technology Utilization Office and the Computer Software and Management Information Center (COSMIC) in Atlanta Georgia.

COSMIC, organized in 1966, is a clearinghouse for programs by NASA and aerospace contractors. It is a joint effort between NASA's Technology Utilization Division and the University of Georgia. COSMIC evaluates and checks out the computer software it receives, adding to its inventory operational programs that have a wide range of potential applications. These programs are then made available through the publication of NASA Tech Briefs and periodic compilations of abstracts. Since NASA has already paid for developing the programs, industries and universities that purchase computer programs through COSMIC save up to 90 percent of the cost of developing similar programs.

At Goddard computer programs may be submitted to COSMIC through the Technology Utilization Office by contacting Sidney Alterescu, COSMIC Representative, on Ext. 6242 (Code 207, Bldg. 8, Rm. 439). Computer programs that are published by NASA as Tech Briefs result in $25 awards for their originators.

Thomas J. Butler

Computer programs by Goddard personnel that have found practical, down-to-earth applications through COSMIC include NASTRAN developed under the direction of Thomas G. Butler of the Projects Directorate. NASTRAN, or NASA Structural Analysis program, was initially developed to analyze the behavior of elastic structures used in spacecraft and launch vehicles. Mr. Butler submitted the program to COSMIC and it is now being used by such companies as Ford Motors to design better trucks and passenger cars. One use Ford is making of the program is in predicting the performance of steering linkages and other components of its 1973 line of light trucks. The program is also being used by many aircraft companies and universities.

Harald Shapiro and Richard Babst

Richard Schmadebeck and Dr. Jacob Trombka

Barton J. Howell

Gerald Halpert

A few years ago, Dr. Jacob Trombka and Richard Schmadebeck of the Theoretical Studies Branch developed a program for use in spectrographic analysis of the lunar surface during Apollo missions. Submitted to COSMIC, their program for "A Least-Square Method for Resolving Complex Pulse Height Spectra" is now being used by the Department of Public Health at the University of Michigan to detect environmental and nuclear pollution. The program is also being used by the Law Enforcement Institute in the detection of drugs and explosives, and, says Dr. Trombka, it may even play a future role in new techniques for underwater mapping.

Other recent COSMIC programs by Goddard personnel and contractors include: "A Fortran IV Program for Calculating and Plotting Surface Area and Pore Size of Materials" by Gerald Halpert of Goddard; "Advanced Mission Analysis Program" by W. S. Bjorkman and M. J. Brooks of the Philco Ford Corporation; "Tracking Antenna Deformation Computer Program" by Arnold E. Galef, TRW Systems Group; "Computer Analysis of Low Resolution Mass Spectra" by Richard W. Babst of Sperry Rand and H. Shapiro of Goddard; "Ray Tracing Program with Options for Diffraction Gratings" by Barton J. Howell of Sperry Rand; and "TCB Operation Inventory System" by Hung-Yuan Tu of Computing and Software, Inc. Each of these programs has a wide range of potential applications and has been published as a NASA Tech Brief.

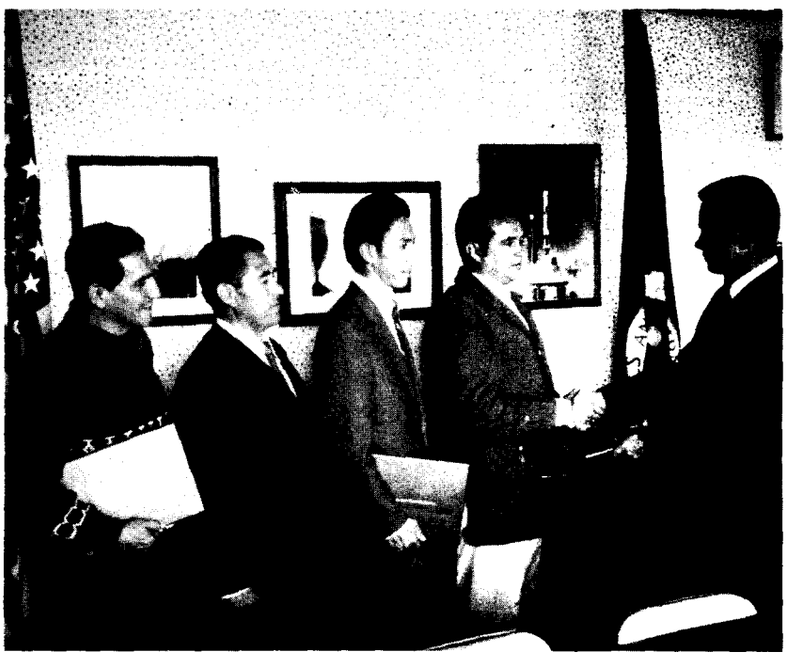
FORT MYERS, FLORIDA. Mrs. James C. Wilhelm recently received a special award from Goddard for the contributions her late husband made toward the Apollo 11 moon landing while he was employed by the Center's Aircraft Operations Section. Mrs. Wilhelm receives the plaque from Chet Matthes, Fort Myers Station Director. With her are her sons Alan and Ricky (right).

Electronics Course in Quito

In an effort to improve the technical capabilities of Ecuadorian personnel at the NASA Tracking Station in Quito, Ecuador, NASA implemented a training program in July 1971 which would provide training in basic and advanced electronics to selected Ecuadorian personnel who work at the satellite tracking station.

The first phase of the program in basic electronics was completed recently by four Ecuadorians. They will now start an advanced electronics and mathematics course which will last approximately six months.

Upon successful completion of the advanced electronics course the students will attend station equipment courses which will further qualify them to operate and maintain station equipment.



QUITO, ECUADOR. Station Director John F. South presents certificates of completion in Introduction to Electronic Engineering Technology. This is the first class of Ecuadorians from the station enrolled in the training program recently started by NASA. From left the students are: Jorge Gallardo, Louis Valdiviesco, Eduardo Yépez, and Rafael Londoño.

ATS 1 in the Field of Law Enforcement

A NASA satellite already credited with an assist in saving the lives of two Alaskan women, and providing educational, medical and news services to our largest state, is now proving itself valuable in the field of law enforcement.

ATS 1 (Applications Technology Satellite), a five year old synchronous orbit, multiple channel voice-TV switchboard-in-the-sky, has recently concluded a series of finger print identification feasibility tests performed by Public Systems Corp., Sunnyvale, California under contract to the Law Enforcement Assistance Administration, United States Department of Justice.

During the ten day tests, fingerprints were sent from the Los Angeles County Sheriff's Department to the satellite and then to the Criminal Identification Bureau of the California Department of Justice in Sacramento. Signals received in Sacramento were used to produce a copy of the fingerprints and were also stored on magnetic tape, then retransmitted via ATS-1 to the Florida Department of Law Enforcement, Tallahassee, which was simulating the FBI's National Identification Bureau's role as a part of a potential national system using satellites to link law enforcement agencies together.

Highlight of the test sessions designed to determine equipment specifications needed for future operating systems were the "hits," or actual identification, of three "hot print" sets from suspects aprehended in Los Angeles. These prints were transmitted from Los Angeles via the satellite to an ATS-1 earth-receiving station in Sacramento and verified within minutes through the California State Identification Bureau there.

Under the present system, state and local law enforcement agencies send fingerprints to state identification bureaus or to the FBI for positive identification and determination of personal criminal record. Because of the need for accuracy in these "makes," most police departments use the U.S. mail as a means of getting fingerprints to the identification bureaus. Usually, a seven-to-ten day period is required to obtain a reply. Use of satellites would reduce this turn-around time for both identification and transmittal of the criminal records.

The experimental ATS-1 project involves the coordinated efforts of federal, state, local governmental agencies and private industry. It was conducted by Project SEARCH, a 20 state consortium formed to develop and test prototype information and communications systems which upgrade the effectiveness of law enforcement and criminal jusitce agencies. California has been designated to coordinate all Project SEARCH activities on behalf of the 20 participating states, through the California Crime Technological Research Foundation.

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